

PERIPHERAL READINESS PROTOCOL

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Field of the Invention

This invention relates to the use of multi-function peripherals (MFPs), and
5 specifically to a scheduling system for providing a warming session to insure MFP readiness use
upon demand.

Background of the Invention

It is inconvenient and wasteful for a user to have to wait while an output devices,
such as a multi-function peripheral (MFP) is warming before it can be used. The wait time is
10 wasteful of individual resources, as the wait time is essentially down-time, which could be
otherwise put to productive use. For example, if a user schedules a meeting and is aware that the
participants will need copies of various materials that will be distributed at the meeting, the user
can insure that a predetermined MFP will be warmed and ready to function a few minutes before
the meeting. Alternatively, the user can schedule standing “warming times” with a MFP, that may
15 correspond to standing meetings on the user's outlook calendar.

the wait-time problem is solved in the prior art, at least in part, by allowing an administrator of an MFP to modify the power save mode on the MFP. For example, the MFP can be set to remain active, *i.e.*, not power off, even if it is not in use, eliminating the need for a warming cycle. Alternatively an MFP user can send a “warm-up” command to the MFP, as
20 described in U.S. Patent No. 5,930,551, to Nakazato *et al.*, granted July 27, 1999, for *Printing system alleviating timing problems due to warm-up and paper outage*, describes a printing system

alleviating timing problems due to warm-up and paper outage. According to a second aspect of the invention, before starting to prepare the data for the first page, the host computer sends the MFP a warm-up command, causing the MFP to commence preparations for printing. This warm-up command however is sent just prior to printing and is not scheduled.

5 U. S. Patent No. 5,714,995 to Wiklof *et al.*, granted February 3, 1998, for *Thermal printhead with enhanced remote voltage sense capability*, describes a thermal printhead which is formed on a substrate. Plural of thermal print elements in the thermal printhead are formed in a linear array, wherein each of the plural thermal print elements is respectively connected to a plurality of common electrode traces and a plurality of ground electrode traces. The common 10 electrode traces are switchably connected to a single common electrode and the ground electrode traces are connected to a single ground electrode.

U. S. Patent No. 6,231,154 to Corrigan, granted May 15, 2001, for *Thermal ink jet print head and temperature control apparatus and method*, describes a thermal ink jet print head with numerous firing elements on a die, and a temperature sensor on the die with a sensor voltage 15 output proportional to a sensed temperature. A digital to analog converter has a digital input and an output voltage proportional to the value of a digital word received by the digital input, and a comparator has a first input connected to the sensor voltage output and a second input connected to the converter voltage output.

U. S. Patent No. 6,390,582 to Laharaty *et al.*, granted May 21, 2002, for *Method 20 for reducing thermal aging in an ink jet print head*, describes a technique for reducing thermal aging in an ink jet print head while avoiding significant warm-up times. The method uses multiple print head standby temperatures to reduce the effects of thermal aging over time. The ink for the

printer is a phase change ink. The ink jet printer has a print head, the print head printing at a first print temperature and the print head standing by a different second standby temperature lower than the first print temperature. The ink is ejected from the print head by applying a voltage to a transducer. The method includes monitoring the time the printhead is at the second standby 5 temperature, calculating a thermal aging period for the print head at the standby temperature, and at a predetermined value for the thermal aging period, increasing the voltage applied to the transducer when ink is ejected, the voltage being increased at a predetermined rate.

U. S. Patent Application Publication 20020085053 to Kao *et al.*, granted July 4, 2002, for *Method and apparatus for use in inkjet printing for reducing thermal accumulation during inkjet printing*, describes a method and apparatus for use in inkjet printing. The apparatus 10 includes a memory, a heat accumulation calculation device, and an image separating device. The memory is used to store a heat weighting look-up table. When data representative of the image is fed into the heat accumulation calculation device, a heat weighting for the image can be calculated according to the heat weighting look-up table, which can be used to determine the degree of heat 15 accumulation during printing. The image separating device then outputs pieces of image data representing sub-images according to the heat weighting for the image. Finally, the image is formed by printing the sub-images successively according to the pieces of image data. In addition, for some regions where serious heat accumulation is predicted, the densities of the pixels to be 20 printed within the regions can be adjusted to reduce the degrading effect on the printing quality due to the heat accumulation during printing.

U. S. Patent Application Publication 20020085056 to Ylitalo, granted July 4, 2002, for *Method and apparatus for selection of inkjet printing parameters*, describes Methods and

apparatus for inkjet printing include automated techniques for selecting and/or adjusting printing parameters. The techniques include methods for altering test pattern images received on a substrate for assessing certain characteristics, such as adhesion of a particular ink to a particular substrate. A computer selects certain printing parameters based on an assessment of the altered test pattern 5 images.

Summary of the Invention

A scheduling system for an MFP to provided scheduled readiness of the MFP includes an MFP having an EMail address associated therewith; an EMail system for generating user EMails and transmitting the generated EMails; a readiness specification which is contained in 10 a user-generated EMail and which sets parameters controlling the readiness of the MFP; an acknowledgment mechanism in the MFP for generating a reply EMail, indicating that the readiness specification has been received and entered; and an error message generator in the MFP for generating a reply EMail indicating that the readiness specification has not been entered.

It is an object of the invention to provide a scheduling mechanism to insure that an 15 MFP is ready to function on demand.

Another object of the invention is to provide an EMail scheduling mechanism for an MFP.

This summary and objectives of the invention are provided to enable quick comprehension of the nature of the invention. A more thorough understanding of the invention 20 may be obtained by reference to the following detailed description of the preferred embodiment of the invention in connection with the drawings.

Brief Description of the Drawing

Fig. 1 is a block diagram of the invention.

Detailed Description of the Preferred Embodiments

The invention solves the above-described warm-up problem by allowing a user to
5 schedule an MFP for warming before the user needs to use the MFP. The scheduled warming may
be repetitive or a one-time event.

This invention differs from prior art in that the user does not need to remember to
send a warming command to the MFP. The MFP will remember to warm itself, and be ready for
use. This is particularly convenient in the case of repetitive events. The prior art requires that a
10 user remember to send a warming command before each event requiring MFP readiness. This
invention does away with that necessity, in that it does not require administrative intervention.

Administrators will appreciate the freedom provided by the system of the invention, which does
not require administrators to respond to user requests to adjust MFP parameters.

An MFP associated with the scheduling system is assigned an EMail address. An
15 EMail system is provided, which allows a user to generate EMAILS and then transmit the EMails
to other users, workgroup members, and the MFP. The user schedules a warming session with the
MFP by sending an EMail to the MFP from any EMail client. The body of the EMail includes a
starting command, or readiness specification, such as:

mm/dd/yyyy hh:mm [am|pm] [repeat[daily|weekly|monthly|yearly]]

20 which sets parameters for controlling the readiness of the MFP.

If Microsoft Outlook™ is used, the user schedules a meeting using the MFP as a
resource. Each MFP has an EMail address, which provides an identity Outlook can use for

scheduling. The user provides the date/time specification depicted above in the first line of the body of the EMail.

The MFP parses the EMail received from the EMail client and schedule the warming session with the timer queue provided by the particular RTOS real-time operating system (RTOS) of the MFP. The details of scheduling with the RTOS are specific to each RTOS. The MFP is programmed to accept all appointments. If a previous appointment is scheduled, the MFP will use the previous appointment in place of the new appointment, as the MFP will already be scheduled to be active, with the one exception that the most repetitive specification is used. For example, if a warming appointment already exists for 4:30 P.M. everyday, then a new appointment for 4:30 P.M. has no effect on MFP warming. However, if a single warming appointment already exists for 4:30 P.M. and the new 4:30 P.M. appointment is to be repeated daily, the single event appointment will be discarded in favor of the new, repetitive appointment.

The MFP includes an acknowledgment mechanism which generates and sends a reply EMail acknowledgment to the sender via SMTP, with the body of the EMail stating, *e.g.*:

Warming appointment accepted

which indicates that the readiness specification has been received and entered in the MFP.

The MFP also includes an error message generator which, if the MFP is not able properly to parse the user's appointment string, responds with an error message indicating that the readiness specification has not been entered, *e.g.*:

<Users original warming appointment string>
Appointment parse error - please use following format.
mm/dd/yyyy hh:mm [am|pm] [repeat[daily|weekly|monthly|yearly]]

The system of the invention allows for other sources to schedule warming sessions besides EMail,

e.g., MFP front panel, SNMP, etc. This provides multiple access protocols for scheduling warming sessions, by having the routines which handle the EMail messaging only deal with the EMail interface. Such routines call other routines which parse, schedule and reply as to whether the scheduling is successful. Each access protocol has its own code which responds to the user over the particular interface.

Fig. 1 illustrates the logic for the scheduling system of the invention, generally at 10. In one embodiment of the invention, Microsoft Outlook™ may be used to schedule a warming session with a MFP. Another embodiment of the invention may utilize any EMail client. The scheduling system is initiated at "Begin," block 12. The system inquires whether Microsoft Outlook™ is in use, block 14, and if yes, a new appointment is scheduled, block 16. The EMail address for the MFP is obtained, block 18, by selecting "Attendee availability/invite others," and preparation is made to enter the warming specification as an EMail message, block 20. If Microsoft Outlook™ is not in use, the user specifies the EMail address of the MFP, block 22, enters the warming specification to be parsed by the MFP, block 24, and sends the EMail to the MFP, block 26.

The user waits for the MFP to send a reply to the appointment, block 28. The user checks the reply EMail message from the MFP, block 30, to determine if the event has been scheduled. If the scheduling has not been successful, the user corrects any errors and resends the EMail message to the MFP again, block 32, and again waits for the MFP's reply, block 28. Blocks 20 30, 32 and 28 are repeated until the MFP responds with a successful scheduling reply. When a successful scheduling reply is received, the user is finished, and the scheduling system ends its operation, block 34.

Thus, a scheduling system for an MFP has been disclosed. It will be appreciated that further variations and modifications thereof may be made within the scope of the invention as defined in the appended claims.